Black Cat Lite 2 Relay (ZWBCL2)

Product Code	Z Wave Frequency
ZWBCL2-AUS	921.4
ZWBCL2-EURO	868.4
ZWBCL2-USA/Canada	908.4
ZWBCL2-JP	922.5

The **Black Cat LITE 2** is an in-wall double switch module that is a transceiver which is also a security enabled module. Communication is based on Z-Wave Plus technology, and it is fully compatible with any Z-Wave™ enabled network.
The space efficient design of the **Black Cat LITE 2** module enables it to be easily hidden in a wall box or cavity.
The **Black Cat LITE 2** supports Security Command Class and its adaptive programming is capable of learning through a secured controller. Its functionality and supported command classes are identical when included as a secure and non-secure module.
There are many different kinds of application for this module to switch a Loads On or Off. One common application is light control. If the **COM** terminal is directly connected to the AC Line terminal, the new smart relay calibration technology can reduce the inrush current caused by the load and let the module work perfectly with many kinds of light such as incandescent, fluorescent and LED light.
This module can also connect to Alternative power supplies such as 24 to 48 VDC.

Supported Switches.
The module supports mono-stable switches (push button) and bi-stable switches (On/Off).
The module is factory set to operate with bi-stable switches in Edge mode.
Important …… Danger of electrocution!

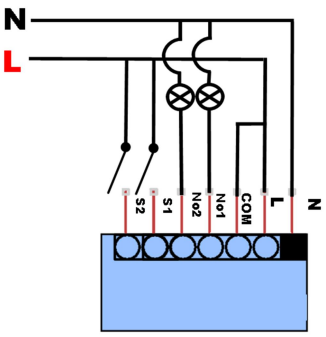
- This module installation requires a great degree of skill and may be performed only by a qualified and licensed electrician. The Warranty may be voided if not installed by a Qualified REC/Installer.
- Even when the module is turned off, voltage may be present on its terminals. Any works on configuration changes related to connection mode or load must be always performed by disconnected power supply (disable at the fuse box).

Installation

- Before installation, choose a suitable location avoiding facing direct sunlight, humid or dusty environments. Suitable ambient Temperature is 0-40°C and do not locate where combustible substances or any source of heat is present. i.e. fires, boilers, radiators etc.
- Disconnect and isolate the power supply.
- Connect the module according to electrical diagram.
- Locate the antenna far from metal elements (as far as possible).
- Do not shorten the antenna.
- After putting it into service, the body of Switch will become warm to touch, this phenomenon is normal.

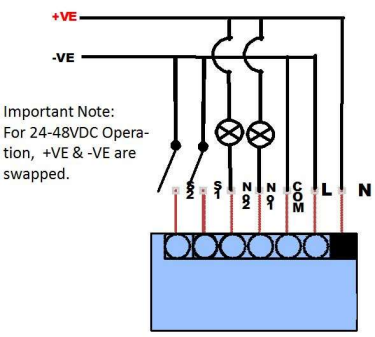
Note!
Do not connect the module to loads exceeding recommended values. Connect the module only in accordance to the below diagrams. Improper connections may be dangerous and may result in damage to the module.

Electrical Diagram for 240V AC



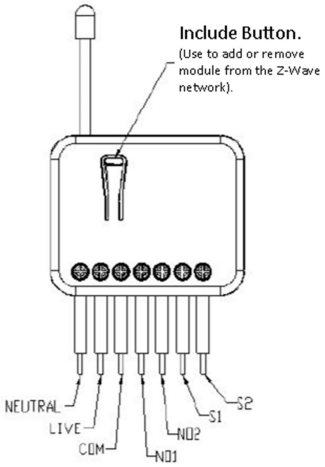
COM Input for Electrical device power supply
N01 Output for Device 1
NO2 Output for Device 2
S1 Input for switch 1
S2 Input for Switch 2
N Neutral lead
A Active lead

Electrical Diagram for 24VDC



Important Note:
For 24-48VDC Operation, +VE & -VE are swapped.

COM Input for Electrical device power supply
N01 Output for Device 1
NO2 Output for Device 2
S1 Input for switch 1
S2 Input for Switch 2
-VE Negative lead
+VE Positive lead



Module Inclusion Adding to Z-Wave™ Network.

On the front casing, there is an on/off button (Include Button) with LED indicator below which is used to toggle the switch on and off or carry out the inclusion, exclusion, reset or association process.
When first power applied, its LED flashes on and off alternately and repeatedly at 0.5 second intervals. It implies that it has not been assigned a node ID and starts Auto Inclusion.

The function of Auto Inclusion will be executed as long as the in wall switch does not have Node ID and has just been connected to the mains power.
Note: Auto inclusion timeout is 2 minutes during which the node information of the explorer frame will be emitted once every several seconds. Unlike the “inclusion” function as shown in the table below, the execution of auto inclusion is free from pressing the On/Off button on the Switch.

LED Indicators.

State Type	LED Indentification
Normal	Whenever the device is switched ON or OFF by S1 or S2, the ON/OFF button or RF command, the LED will light upwhen the device is switched ON
No Node ID	Under normal operation, where the device has not been allocated a node ID, the LED flashes on and off alternately at 2 second intervals. By pressing S1 or S2 or the ON/OFF button, it will stop flashing temporarily.
Learning	When the device is in learning mode, the LED flashed on and off at second intervals.
Overload	When overload state occurs, the device is disabled a nd the LED flashes on and off at second intervals. Overload state can be cleared by disconnecting and reconnecting the device to Mains power.

Installation.

- Connect module to power supply
- Enable add/remove mode on main controller
- Auto-inclusion timeout is 2 minute after connected to power supply or
- Press Include button for more than 2 second or
- Press push button S1 three times within 3s (3 times change switch state within 3 seconds).

NOTE 1: For auto-inclusion procedure, first set main controller into inclusion mode and then connect module to power supply.

The table below lists the operation summary of basic Z-Wave functions. Please refer to the instructions for your Z-Wave™ Certified Primary Controller to access the Setup function, and to include/exclude or associate the module.

Function	Description	Indication
No Node ID	The Z-Wave Controller does not allocate a node ID to the Switch	LED 2 Second on, 2 Second off
Inclusion	1. Put your Z-Wave controller into Inclusion Mode by following the instructions provided by the controller manufacturer. 2. Press the Include button 3 times within 2 seconds will enter Inclusion Mode.	One press, one flash LED
Exclusion	1. Put your Z-Wave controller into Exclusion Mode by following the instructions provided by the controller manufacturer. 2. Press the Include button 3 times within 2 seconds will enter Exclusion Mode. Node ID has been excluded.	0.5s On, 0.5s Off & enters Auto Inclusion Mode
Reset	1. Press the Include button 3 times within 2 seconds will enter Exclusion Mode. 2. Within 1 second, press Include button for 5 seconds. 3. Node ID is excluded.	Use this procedure only id Primary controller is lost or wise inoperable. 0.5s On, 0.5s Off & enters Auto Inclusion Mode
Association	1. The Module isan always listening Z-wave device. Associations may be added or removed by a controller at any time. Or If your controller requires to have the Module to send a Node Information Frame for Associations, then press the On/Off Button 3 times within 2 seconds. 2. There is only 1 Association group for this device.	

1. Basic Command Class / Binary Switch Command Class

The Switch will respond to BASIC and BINARY commands that are part of the Z-Wave system.

1-1 BASIC_GET / BINARY_SWITCH_GET

Since the switch has two relays, the Switch will report its On/Off state to the node of Group by setting Configuration parameter 1.

Configuration parameter 1=1(default)

- Report ON either relay 1 is ON or relay 2 is ON
- Report OFF when both relay 1 and relay 2 is OFF

Configuration parameter 1=2 Report ON when relay 1 is ON

- Report OFF when relay 1 is OFF

Configuration parameter 1=3 Report ON when relay 2 is ON

- Report OFF when relay 2 is OFF

Basic Get Command: **[Command Class Basic, Basic Get]**

Basic Report Command:

- Report OFF: **[Command Class Basic, Basic Report, Value = 0(0x00)]**
- Report ON:**[Command Class Basic, Basic Report, Value = 255(0xFF)]**

Binary Switch Get Command:**[Command Class Switch Binary, Switch Binary Get]**

Binary Switch Report Command:

- Report OFF:**[Command Class Switch Binary, Switch Binary Report, Value =0(0x00)]**
- Report ON:**[Command Class Switch Binary, Switch Binary Report, Value =255(0xFF)]**

1-2 BASIC_SET / SWITCH_BINARY_SET

Since the switch has two relays, the load attached to the Switch will turn on or off upon receipt of the following commands from a Z-Wave Controller by setting Configuration parameter 1.

Configuration parameter 1=1(default) switch ON and OFF both relay 1 and relay 2
Configuration parameter 1=2 switch ON and OFF of relay 1
Configuration parameter 1=3 switch ON and OFF of relay 2
[Command Class Basic, Basic Set, Value = 1~99,255(0xFF)]: the load attached to the Switch turns on.
[Command Class Basic, Basic Set, Value = 0(0x00)]: the load attached to the Switch turns off.
[Command Class Switch Binary, Switch Binary Set, Value = 1~99,255(0xFF)]: the load attached to the Switch turns on.
[Command Class Switch Binary, Switch Binary Set, Value = 0(0x00)]: the load attached to the Switch turns off.

2. Z-Wave's Groups (Association Command Class Version 2)
The Switch can be set to send reports to control associated Z-Wave devices. It supports 3 association groups which every group has one node support.
Group1~Group3 support SWITCH_BINARY_REPORT.
For group 1, the Switch will report ON/OFF status of Relay1 and Relay2
For group 2, the Switch will report ON/OFF status of Relay1
For group 3, the Switch will report ON/OFF status of Relay2

2-1 Auto report to Grouping 1 ~3(Maximum Node 1)
2-1-1 On/Off Event Report
When "on" or "off" state has been changed (ex. Press S1 S2 or include on/off button), it will send Binary Switch Report to the nodes of Group1~3.

Binary Switch Report
ON:**[Command Class Switch Binary, Switch Binary Report, Value=255(0xFF)]**
OFF:**[Command Class Switch Binary, Switch Binary Report, Value=0(0x00)]**

2-1-2 Overload alarm report command
When the Switch detects a overload, it will send Alarm Report to the corresponding Group.
The content of the Alarm Report.
Alarm report command:**[Command Class Alarm, Alarm Report, Alarm Type = 0x08, Alarm Level = 0xFF]**

2-2 Multi Channel Command Class Version 3
This switch also supports Multi channel command class(version 3) , which includes BINARY_SWITCH_GET, BINARY_SWITCH_SET,BASIC_GET,BASIC_SET
You may control or get a report from endpoint 3.
2-2-1 BINARY_SWITCH_GET,
You may get the ON/OFF state from every endpoint, when endpoint set to 1 ,
The switch will reply ON(0xFF) if either Relay 1 or Relay2 is ON, report OFF (0x00) when both Relay 1 and Relay2 are OFF. If endpoint set to 2 , the switch will report the state of Relay1 . If endpoint set to 3 and the switch will report the state of Relay 2
Below is an example shows a source endpoint 5 send a Get command to the Switch endpoint 1.

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x05	(this is the endpoint of command owner here we assume endpoint is 5，if the owner doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x01)	(Bit Address =0；Destination End Point range from 1~3)
Command Class = 0x25	(Command_Class_Switch_Binary = 0x25)
Command =0x02	(Switch_Binary_Get = 0x02)

Below is the example show PAN06 report to last command

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x01	Since the endpoint is 1 so PAN06 will reply ON(0xFF) either Relay 1 or Relay2 is ON, report OFF (0x00) when both Relay 1 and Relay2 OFF
(Bit Address+Destination End Point = 0x05)	(Bit Address =0；Destination End Point)
Command Class = 0x25	(Command_Class_Switch_Binary = 0x25)
Command =0x03	(Switch_Binary_Report = 0x03)
Parameter 1 = 0xFF	(ON=0xFF ， OFF=0x00)

2-2-2 BINARY_SWITCH_SET

By using BINARY_SWITCH_SET Command of the Multi Channel Command Class Encapsulation Command, you can switch both Relay1 and Relay2 ON/OFF by setting endpoint to 1 or switch Relay1 ON/OFF by setting endpoint to 2 or switch Relay2 ON/OFF by setting endpoint to 3

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x01	(this is the endpoint of command owner here we assume endpoint is 1，if the owner doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x02)	(Bit Address =0；Destination End Point range1~3)
Command Class = 0x25	(Command_Class_Switch_Binary = 0x25)
Command =0x01	(Switch_Binary_Set = 0x01)
Parameter 1 = 0x00	(ON=0xFF ， OFF=0x00)

Configuration Parameters.

Configuration Parameter	Function	Size (Byte)	Value	Unit	Default	Description
1	Slected Relay	1	1-3		3	1：Relay1 2：Relay2 3：Relay1 & Relay2
2	Edge or Pulse mode or Edge-Toggle mode	1	1-3		1	1：Edge mode 2：Pulse mode 3：Edge-Toggle mode
3	Restore switch state mode	1	0-2		1	0 : Switch off 1 : Last switch state 2 : Switch on
4	Auto off timer	2	0-0x7FFF	1s	0	0 : Disable auto off function 1-0x7FFF : 1s ~ 32767s
5	RF off command mode	1	0-3		0	0 : Switch off 1 : Ignore 2 : Switch toggle 3 : Switch on
6	Existence of Endpoint3	1	1-2		1	1 : Endpoint3 exist 2 : No Endpoint3

3-1 **Selected Relay**
If Controller is not using the Multi_Channel command class to access the relay, you may configure the select value to react the Basic Command Class or Binary Switch Command Class.
3-1-1 Selected Relay1 and Relay2： **Default select is 3**

3-1 Edge / Bi-Stable (Push Button) / Edge-Toggle mode

Manual switch S1 and S2 can set to Edge mode or Pulse mode or Edge-Toggle mode, default value is Edge mode.

3-1-1 Edge mode:

This mode is suitable for the bi stable wall switch that has indicator on the switch in which the same position corresponds to same state of the relay 1.

If the relay changes state because of receiving a Z-Wave RF command, the switch position may need to be altered two times (switch on to off or switch off to on) to bring the relay back to its corresponding state.

3-1-2 Bi-Stable (Push Button) mode

This mode is suitable for the push button type wall switch to swap the state of the Relay.

3-1-3 Edge-Toggle mode: this mode is suitable for the normal bi-stable switch, every time when the state of the wall switch changes this will also swap the state of the Relay. Recommended for use with Vera & Home Seer.

3-3 Restore switch state mode

Whenever the AC power returns after a failure the switch will restore the switch state which could be SWITCH OFF、LAST SWITCH STATE、SWITCH ON. The default setting is LAST SWITCH STATE.

3-4 Auto off timer ：

Whenever the switch switches to on, the auto off timer begin to count down. After the timer decreases to zero, it will switch to off automatically. However if the Auto off timer is set at 0, the auto off function will be disabled. The default setting is 0.

3-5 RF off command mode

Whenever a switch off command, BASIC_SET 、BINARY_SWITCH_SET 、SWITCH_ALL_OFF, is received, it could be interpreted as 4 different commands.

3-5-1 Switch Off：It switches to OFF state. The default setting is Switch Off.

3-5-2 Ignore：The switch off command will be ignored.

3-5-3 Switch Toggle：It switches to the inverse of current state.

3-5-4 Switch On：It switches to ON state.

3-6 Existence of Endpoint3 ：

The endpoint3 of Multi-Channel Command Class is related to relay1 and relay2. It may be redundant for the need to control relay1 or relay2 individually. When the Existence of Endpoint3 is set as 0, the endpoint3 of Multi-Channel Command Class will be disabled. The default value is 1.

4. **Protection Command Classes**

The switch supports Protection Command Class version 2, it can protect the switch against unintentional control by e.g. a child. It can also protect the switch from being turned off by setting it in “No RF Control” state.

After being set to “Protection by sequence” state, any intentional pressing of On/Off button or S1/S2 should be hold longer than 1 second, or the switch state will not change.

However, the operation of learn function does not change, because learning will not be protected.

5. **Firmware update over the air (OTA)**
This switch is based on 500 series SoC and supports Firmware Update Command Class, it can receives the updated firmware image sent by controller via the Z-wave RF media. It is a helpful and convenient way to improve some functions if needed.

6. **Command Classes**
The Switch supports Command Classes including…
* COMMAND_CLASS_ZWAVEPLUS_INFO
* COMMAND_CLASS_VERSION_V2
* COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2
* COMMAND_CLASS_DEVICE_RESET_LOCALLY
* COMMAND_CLASS_ASSOCIATION_V2
* COMMAND_CLASS_ASSOCIATION_V1
* COMMAND_CLASS_CONFIGURATION
* COMMAND_CLASS_ASSOCIATION_GRP_INFO
* COMMAND_CLASS_POWERLEVEL
* COMMAND_CLASS_SWITCH_BINARY
* COMMAND_CLASS_BASIC
* COMMAND_CLASS_SWITCH_ALL
* COMMAND_CLASS_ALARM
* COMMAND_CLASS_SCENE_ACTIVATION
* COMMAND_CLASS_SCENE_ACTUATOR_CONF
* COMMAND_CLASS_PROTECTION
* COMMAND_CLASS_FIRMWARE_UPDATE_MD_V2
* COMMAND_CLASS_MULTI_CHANNEL_V3
* COMMAND_CLASS_CONFIGURATION

7. Technical Specifications

Specification
Operating Voltage 100 ~240VAC /50Hz/60Hz 24-48V DC ±10%
Maximum Load 6.5A (230Vac/120Vac) (Resistive load)
Range Minimum 40 m in door 100m outdoor line of sight
Operating Temperature 0°C ~ 40°C
Frequency Range 921.40MHz.

This device can be included and operated in any Z-Wave network with other Z-Wave certified modules from any other manufacturers. All constantly powered nodes in the same network will act as repeaters regardless of the vendor in order to increase reliability of the network.

Important disclaimer.
Z-Wave wireless communication is inherently not always 100% reliable, and as such, this product should not be used in situations in which life and/or valuables are solely dependent on its function.

Trouble Shooting.

Sympton	Cause of failure	Recommendation
The Device is not working and LED is Off	1. The device is not connected to the Main Power supply. 2.The device is faulty.	1. Check power connections 2. Don't open the device. Contact us for instructions.
The Device LED is illuminating but cannot control the ON/OFF function.	Check to see if the Load is correctly connected and doesn't have an independent ON/OFF Switch	Set the ON/OFF switch of the Load to ON.
The Device LED is illuminating but a sensor cannot control the device	1. Association not carried out. 2. Possible frequency interference.	1. Perform Association 2. Wait for a while, then retry.
LED keeps Flashing continulsly and cannot control	Overload Condition	Remove the Load and check max. Load. Do Not Exceed 85C 230VAC/120VAC Resistive Load.

FCC ID : RHHPAN05

Warning:

1. Plug out to disconnect from power supply; do not plug in line.
2. Do not exceed the max rating

Disposal

This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.

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FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital module, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

This module complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This module may not cause harmful interference, and
(2) This module must accept any interference received, including interference that may cause undesired operation.
FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

www.blackcatcontrolsystems.com.au
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